

Appl. No. 10/099,621
Amdt. Dated Mar. 15, 2004
Reply to Office Action of Dec. 15, 2003

Amendments to the Specification:

Please amend the specification as follows:

[0002] Optical attenuators are widely used to control the intensity of optical signals transmitted in an optical network. Optical attenuators are classified as fixed attenuators or variable attenuators. A fixed attenuator provides a fixed attenuation of optical signals, while a variable attenuator allows adjustment of the attenuation of the optical signals. A variety of variable attenuators are available, among which the most commonly used operate by separating ends of coaxially aligned optical fibers to form a gap therebetween. The amount of attenuation achieved by this kind of ~~attenuators~~attenuator is, in general, dependent upon the distance between the ends of the two optical fibers. Thus, the attenuation can be controlled by axially displacing one fiber relative to the other to change the distance between the fibers.

[0019] Referring to Figures 2, 3 and 4, the VAC 11 of the present invention comprises a ferrule 50, an external housing 10, an internal housing 20, ~~and~~ a U-clip 101, a helical spring 2, a protective sheath 3, a deformable tube 90, a strain relief 100 and a double screw mechanism 110 (see Fig. 3). The internal housing 20 has a front end (not labeled) to which the external housing 10 is connected, and a rear end (not labeled) to which the double screw mechanism 110 is connected. The internal housing 20 defines a central bore 206 extending along its longitudinal axis, two holding beams 201, 202 extending from the rear end, a stopping slot 203 in the center accommodating the U-clip 101, and two keyways 204 parallel to the longitudinal axis.

[0021] The connecting nut 30 defines an internally-threaded bore 303 and two opposite grooves 301, 302 at the circumference similar to the grooves 251, 252. Please note that in Figure 4, the internally-threaded bore 303 (not labeled in Figure

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4) shows up as a solid, dark mass. This is because the threading is shown on its actual scale, but the lines used in the drawing were not fine enough to resolve the individual ~~threads~~thread lines and instead ran together.

[0022] As shown in Figure 6, the adjusting knob 40 is tubular in shape having a bore (not labeled) along its longitudinal axis and a circumferential rib 403. ~~Internal threads~~An internal thread 402 ~~are~~is formed on an internal surface of the bore (not labeled), and an external thread 401 ~~are~~is formed on an external surface between the circumferential rib 403 and a forward end (not labeled) of the adjusting knob 40. The internal ~~threads~~thread 402 ~~have~~has a first screw pitch and the external ~~threads~~thread 401 ~~have~~has a second screw pitch, the two screw pitches being different.

[0024] Referring to Figures 2, 3 and 5, in assembly, the helical spring 2 slides over the ferrule holder 60 and is pushed forward to the front end of the ferrule holder 60. The mounting screw 25, the connecting nut 30 and the adjusting knob 40 in turn receive the ferrule holder 60 with the externally-threaded section 602 ~~threadedly~~threadedly engaging with the internal ~~threads~~thread 402 of the knob 40, and with the knob 40 being partially received in the connecting nut 30 with the external ~~threads~~thread 401 of the knob 40 ~~threadedly~~threadedly engaging with the internally-threaded bore 303 of the connecting nut 30. The C-clip 80 is received in the circumferential slot 603 of the ferrule holder 60 for limiting the rearward movement of the adjusting knob 40. The ferrule holder 60 is inserted into the central bore 206 of the internal housing 20, with the front end thereof located in the internal housing 20 and the stoppers 601 engaging ~~within~~with the keyways 204 of the internal housing 20 to prevent the ferrule holder 60 from rotating relative to the internal housing 20. The mounting screw 25 and the connecting nut 30 are fixed on the rear end of the internal housing 20 by the four grooves 251, 252, 301, 302 ~~engaging~~engagingly ~~with~~receiving the two holding beams 201, 202 of the internal housing

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20. The U-clip 101 is inserted into the stopping slot 203 and is fitted around the ferrule holder 60 with the helical spring 2 disposed between the enlarged front end (not labeled) of the ferrule holder 60 and the U-clip 101. The protective sheath 3 is preferably attached to the rear end of the internal housing 20 by engaging with the externally-threaded sections 253 of the mounting screw 25 for shielding and preventing the double screw mechanism 110 from being accidentally actuated. The external housing 10 slides over the front end of the internal housing 20. The ferrule 50 is accommodated in a recess (not shown) defined in the enlarged front end of the ferrule holder 60. The ferrule 50 partially extends beyond the external housing 10 for insertion into the coupling sleeve 12 during mating.

[0026] In use, the ferrule holder 60 moves forward and rearward along its longitudinal axis with respect to the adjusting knob 40 when the adjusting knob 40 is rotated. The external ~~thread~~thread 401 and the internal ~~thread~~thread 402 of the adjusting knob 40 are arranged in such a way that when the knob 40 makes a turn, the holder 60 is linearly moved with respect to the knob 40 in a predetermined first direction a distance corresponding to the pitch of the internal ~~thread~~thread 402, while the knob 40 is linearly moved with respect to the connecting nut 30 in an opposite second direction a distance corresponding to the pitch of the external ~~thread~~thread 401. Thus, a total displacement of the holder 60 and thus the first optical fiber carried therein is equal to the pitch of the internal ~~thread~~thread 402 minus the pitch of the external ~~thread~~thread 401. Taking 0.25mm and 0.35mm as examples of the pitches of the external ~~thread~~thread 401 and internal ~~thread~~thread 402, the displacement induced on the holder 60 is $0.35\text{mm}-0.25\text{mm}=0.10\text{mm}$ when the knob 40 makes a full turn. This gives a finer resolution in adjusting the distance (S) between the first and second optical fibers (reference Fig. 7) and thus improves upon a variable optical attenuator of the prior art.